

**Sultan Qaboos University**  
**Physics Department, College of Science**  
**Physics 2107: Physics for Engineering I Fall Semester 2006 - Test II**

**Monday 13<sup>th</sup> November 2006**

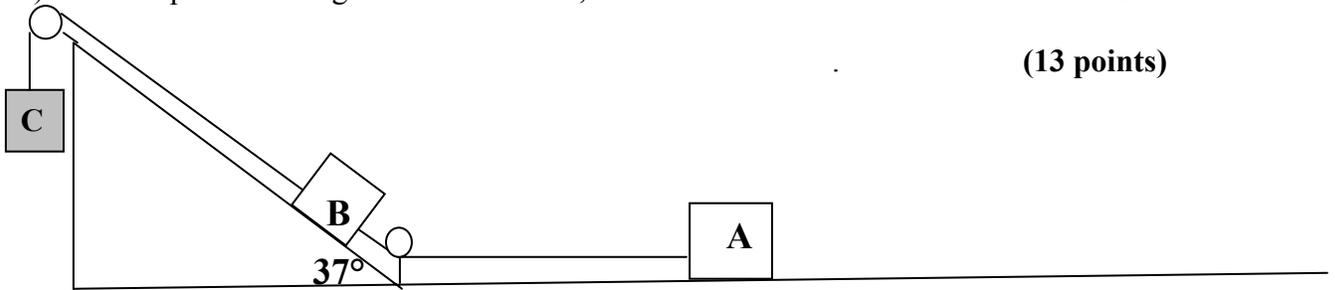
**Time: 5:15 – 6:45 pm**

ID No.:	1	2	3	4	Total
Name:					

Full Mark:40 points

Please check that your examination paper has 4 **Questions**  
**Do not use additional papers**

- 1) Blocks A, B, and C are placed as in the figure and connected by ropes of negligible masses. Both A and B weigh 25.0 N each, and the coefficient of kinetic friction between each block and the surface is 0.35. Block C moves down with constant velocity.
  - a) Find the tension in the rope connecting blocks A and B
  - b) What is the weight of block C?
  - c) If the rope connecting A and B were cut, what would be the acceleration of block C?



2) A force  $\mathbf{F} = 2.5xy\hat{i}$  (where  $\hat{i}$  is the unit vector, F is in Newton and x and y are in meters) acts on an object in the x-direction. Calculate the work done on the object by this force for the following displacement:

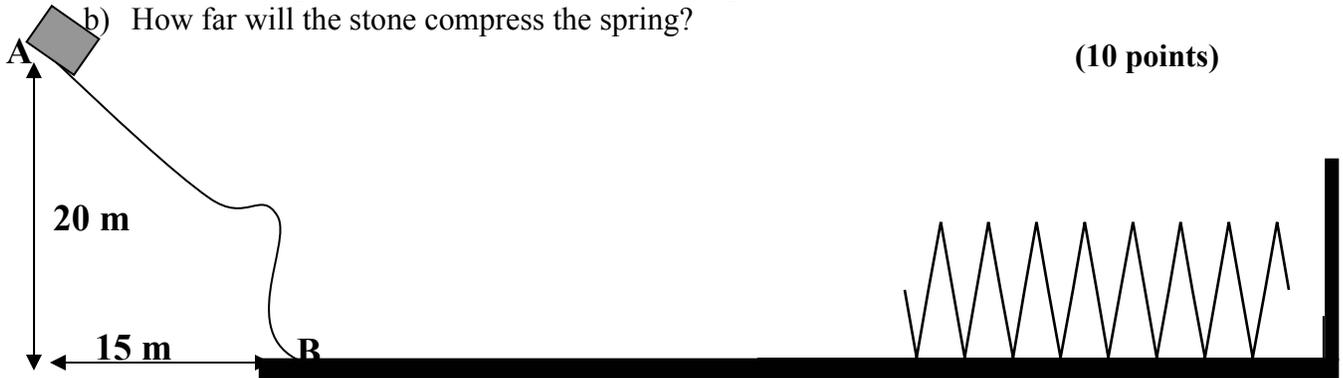
- a) The object starts at the point  $x=0, y=3.0$  and moves parallel to the x-axis to the point  $x=2.0$  and  $y=3.0$
- b) The object starts at the point  $x=2, y=0$  and moves parallel to the y-axis to the point  $x=2.0$  and  $y=3.0$
- c) The object starts at the point  $x=0, y=0$  and moves along the line  $y=1.5x$  to the point  $x=2, y=3.0$

**(7 points)**

- 3) A 15.0 kg stone slides down a frictionless hill, leaving point A with a speed of 10.0 m/s to reach point B on the ground and continue on a horizontal friction surface with kinetic coefficient  $\mu_k=0.2$  for a distance of 100.0 m. Then, it runs into a very long spring with spring constant 2.0 N/m.

- a) What is the speed of the stone when it reaches point B?  
b) How far will the stone compress the spring?

(10 points)



4) An open container of mass 50.0 kg is rolling to the left at speed of 5.0 m/s on a frictionless surface. A 15.0 kg box slides down a  $37^\circ$  inclined plane and leaves the end of the plane with speed of 3.0 m/s. The end of the plane is a vertical distance of 4.0 m above the bottom of the container (see figure). The box lands in the container and they roll off together.

- a- What are the velocity components of the box just before it lands in the container?
- b- What is the magnitude and direction of the final velocity of the container?

